

WHAT IS CLAIMED IS:

1. A method for producing an additive carbon black comprising combining substantially neat amine antidegradant and carbon black.
2. The method of claim 1 wherein the amine antidegradant is neat.
3. The method of claim 1 wherein the amine antidegradant comprises naphthylamine, naphthylamine derivative, diphenylamine, diphenylamine derivative, p-phenylenediamine, p-phenylenediamine derivative, other amine compound, or a mixture thereof.
4. The method of claim 1 wherein the amine antidegradant comprises p-phenylenediamine (PPD) or a p-phenylenediamine derivative.
5. The method of claim 1 wherein the amine antidegradant comprises N-(1,3-dimethylbutyl)-N'-phenyl-p-phenylenediamine) (6-PPD).
6. The method of claim 1 wherein the amine antidegradant comprises (N,N'-bis-(1,4-dimethylpentyl)-p-phenylenediamine) (77-PD).
7. The method of claim 1 wherein the amine antidegradant comprises at least one naphthylamine derivative comprising N-phenyl-1-naphthylamine, N-phenyl-2-naphthylamine, N-(3'-hydroxybutylidene)-1-naphthylamine, a reaction product of N-phenyl-2-naphthylamine and acetone, or a reaction product at low temperature of N-phenyl-2-naphthylamine and acetone.
8. The method of claim 1 wherein the amine antidegradant comprises at least one diphenylamine derivative comprising isopropoxydiphenylamine, bis(phenyl.iso-

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propylidene)-4,4'-diphenylamine, p,p'-toluene.sulfonylamino-diphenylamine, 4,4'-(α,α -dimethylbenzyl)-diphenylamine, mixture of di-aryl-p-phenylenediamine, N,N'-diphenylethylenediamine, N,N'-diphenylpropylenediamine, a reaction product at high temperature of diphenylamine and acetone, a reaction product at low temperature of diphenylamine and acetone, a reaction product at low temperature of diphenylamine-aniline and acetone, a reaction product of diphenylamine and diisobutylene, octylated diphenylamine, nonylated diphenylamine, displaced diphenylamine, alkylated diphenylamine, a mixture of alkylated diphenylamine, a blend of the mixture of diphenylamine and petroleum wax, or derivative of diphenylamine.

9. The method of claim 1 wherein the amine antidegradant comprises at least one p-phenylenediamine derivative comprising N,N'-diphenyl-p-phenylenediamine, N,N'-di-2-naphthyl-p-phenylenediamine, N,N'-bis(1-methylheptyl)-p-phenylenediamine, N,N'-bis(1,4-dimethylpentyl)-p-phenylenediamine, N,N'-bis(1-ethyl-3-methylpentyl)-p-phenylenediamine, N,N'-diaryl-p-phenylenediamine, N-isopropyl-N'-phenyl-p-phenylenediamine, N-cyclohexyl-N'-phenyl-p-phenylenediamine, N-alkyl-N'-phenyl-p-phenylenediamine, N-alkyl-N'-aryl-p-phenylenediamine, N-4-methyl-2-pentyl-N'-phenyl-p-phenylenediamine, N-(1,3-dimethylbutyl)-N'-phenyl-p-phenylenediamine, N-(1-methylheptyl)-N'-phenyl-p-phenylenediamine, N-phenyl-N'-(3-methacryloyloxy-2-hydroxypropyl)-p-phenylenediamine, hindered diaryl-p-phenylenediamine, phenylhexyl-p-phenylenediamine, phenyloctyl-p-phenylenediamine or a mixture of diaryl-p-phenylenediamine.

10. The method of claim 1 wherein the amine antidegradant comprises at least one suitable amine compound comprising N,N'-di-o-toryl.ethylenediamine, N,N'-disarylclidene-1,2-propanediamine, a reaction product of amine and ketone, derivative of aromatic amines or a condensation product of butylaldehyde and aniline.

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11. The method of claim 1 wherein the carbon black is surface treated with the amine antidegradant.
12. The method of claim 1 wherein the combination occurs by spraying the amine antidegradant on the carbon black.
13. The method of claim 1 wherein the combination occurs by beading the carbon black with the amine antidegradant.
14. The method of claim 1 wherein the ratio of amine antidegradant to carbon black is from about 0.01 to about 8 parts by weight antidegradant to about 100 parts by weight carbon black.
15. The method of claim 1 wherein the ratio of amine antidegradant to carbon black is from about 1.8-about 2 parts by weight antidegradant to about 45- about 50 parts by weight carbon black.
16. An additive carbon black made by the method of claim 1.
17. A method for producing a surface-treated additive carbon black comprising combining carbon black with an amine antidegradant, wherein the combination occurs substantially free of a solvent or carrier.
18. The method of claim 17 wherein the combination occurs in the absence of a solvent or carrier.
19. The method of claim 17 wherein the amine antidegradant comprises naphthylamine, naphthylamine derivative, diphenylamine, diphenylamine derivative, p-

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phenylenediamine, p-phenylenediamine derivative, other amine compound, or a mixture thereof.

20. The method of claim 17 wherein the amine antidegradant comprises p-phenylenediamine or a p-phenylenediamine derivative.

21. The method of claim 17 wherein the amine antidegradant comprises N-(1,3-dimethylbutyl)-N'-phenyl-p-phenylenediamine) (6-PPD).

22. The method of claim 17 wherein the amine antidegradant comprises (N,N'-bis-(1,4-dimethylpentyl)-p-phenylenediamine) (77-PD).

23. The method of claim 17 wherein the amine antidegradant comprises at least one naphthylamine derivative comprising N-phenyl-1-naphthylamine, N-phenyl-2-naphthylamine, N-(3'-hydroxybutylidene)-1-naphthylamine, a reaction product of N-phenyl-2-naphthylamine and acetone, or a reaction product at low temperature of N-phenyl-2-naphthylamine and acetone.

24. The method of claim 17 wherein the amine antidegradant comprises at least one diphenylamine derivative comprising isopropoxydiphenylamine, bis(phenyl.isopropylidene)-4,4'-diphenylamine, p,p'-toluene.sulfonylamino-diphenylamine, 4,4'-(α,α -dimethyl.benzyl)-diphenylamine, mixture of di-aryl-p-phenylenediamine, N,N'-diphenylethylenediamine, N,N'-diphenylpropylenediamine, a reaction product at high temperature of diphenylamine and acetone, a reaction product at low temperature of diphenylamine and acetone, a reaction product at low temperature of diphenylamine-aniline and acetone, a reaction product of diphenylamine and diisobutylene, octylated diphenylamine, nonylated diphenylamine, displaced diphenylamine, alkylated diphenylamine, a mixture of alkylated diphenylamine, a blend of the mixture of diphenylamine and petroleum wax, or derivative of diphenylamine.

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25. The method of claim 17 wherein the amine antidegradant comprises at least one p-phenylenediamine derivative comprising N,N'-diphenyl-p-phenylenediamine, N,N'-di-2-naphthyl-p-phenylenediamine, N,N'-bis(1-methylheptyl)-p-phenylenediamine, N,N'-bis(1,4-dimethylpentyl)-p-phenylenediamine, N,N'-bis(1-ethyl-3-methylpentyl)-p-phenylenediamine, N,N'-diaryl-p-phenylenediamine, N-isopropyl-N'-phenyl-p-phenylenediamine, N-cyclohexyl-N'-phenyl-p-phenylenediamine, N-alkyl-N'-phenyl-p-phenylenediamine, N-alkyl-N'-aryl-p-phenylenediamine, N-4-methyl-2-pentyl-N'-phenyl-p-phenylenediamine, N-(1,3-dimethylbutyl)-N'-phenyl-p-phenylenediamine, N-(1-methylheptyl)-N'-phenyl-p-phenylenediamine, N-phenyl-N'-(3-methacryloyloxy-2-hydroxypropyl)-p-phenylenediamine, hindered diaryl-p-phenylenediamine, phenylhexyl-p-phenylenediamine, phenyloctyl-p-phenylenediamine or a mixture of diaryl-p-phenylenediamine.

26. The method of claim 17 wherein the amine antidegradant comprises at least one suitable amine compound comprising N,N'-di-o-toryl.ethylenediamine, N,N'-disarylcilidene-1,2-propanediamine, a reaction product of amine and ketone, derivative of aromatic amines or a condensation product of butylaldehyde and aniline.

27. The method of claim 17 wherein the carbon black has a surface area of less than or equal to 130 m²/g.

28. The method of claim 17 wherein the combination occurs by spraying the amine antidegradant on the carbon black.

29. The method of claim 17 wherein the combination occurs by beading the carbon black with the amine antidegradant.

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30. The method of claim 17 wherein the ratio of amine antidegradant to carbon black is from about 0.01 to about 8 parts by weight antidegradant to about 100 parts by weight carbon black.

31. The method of claim 17 wherein the ratio of amine antidegradant to carbon black is from about 1.8-about 2 parts by weight antidegradant to about 45-about 50 parts by weight carbon black.

32. A method of producing an additive carbon black comprising combining carbon black with a neat amine antidegradant, wherein the carbon black has a surface area of less than or equal to $130 \text{ m}^2/\text{g}$.

33. The method of claim 32 wherein the carbon black has a surface area of from about 77 to about $119 \text{ m}^2/\text{g}$.

34. A method of producing an additive carbon black comprising combining carbon black with a substantially neat amine antidegradant, wherein the carbon black has a surface area of less than or equal to $130 \text{ m}^2/\text{g}$ and the amine antidegradant is naphthylamine, naphthylamine derivative, diphenylamine, diphenylamine derivative, p-phenylenediamine, p-phenylenediamine derivative, other amine compound, or a mixture thereof.

35. A method for producing a polymer composition with improved carbon black dispersion characteristics comprising adding an additive carbon black made by the method of claim 1 to a polymer.

36. The method of claim 35 wherein a portion of the additive carbon black is added to the polymer with an additional dry ingredient.

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37. The method of claim 36 wherein the remainder of the additive carbon black is added to the polymer with a liquid ingredient.
38. The method of claim 37 wherein the liquid ingredient comprises oil or an oil mixture.
39. The method of claim 36 wherein an additional dry ingredient comprises filler, accelerator, cure activator, fatty acid, fatty acid derivative, wax, peptizer, or vulcanizing agent.
40. The method of claim 37 wherein a liquid ingredient comprises curable resin, prepolymeric liquid, peroxide, or reodorant.
41. The method of claim 35 wherein the additive carbon black is surface treated with a naphthylamine, naphthylamine derivative, diphenylamine, diphenylamine derivative, p-phenylenediamine, p-phenylenediamine derivative, other amine compound, or a mixture thereof.
42. The method of claim 35 wherein the polymer is a natural rubber (NR), a synthetic rubber, or a mixture thereof.
43. The method of claim 42 wherein the polymer is natural rubber.
44. The method of claim 42 wherein the polymer is a styrene-butadiene rubber (SBR).
45. The method of claim 35 wherein the additive carbon black is added to the polymer at from about 10 to about 80 parts by weight carbon black to about 100 parts by weight polymer.

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46. The method of claim 35 wherein the additive carbon black is added to the polymer at from about 20 to about 60 parts by weight carbon black to about 100 parts by weight polymer.

47. The method of claim 35 wherein the additive carbon black is added to the polymer at from about 40 to about 60 parts by weight carbon black to about 100 parts by weight polymer.

48. The method of claim 35 wherein the additive carbon black is added to the polymer at from about 52 parts by weight carbon black to about 100 parts by weight polymer.

49. The method of claim 35 wherein the additive carbon black is added to the polymer at from about 47 parts by weight carbon black to about 100 parts by weight polymer.

50. The method of claim 35 wherein the additive carbon black is added to the polymer in an internal mixer.

51. The method of claim 50 wherein the carbon black and polymer are mixed until the carbon black is well dispersed in the polymer.

52. The method of claim 51 further comprising adding an additional ingredient.

53. The method of claim 52 wherein the additional ingredient comprises a curing agent.

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54. The method of claim 51 further comprising milling, cooling, extruding, calendering, pelletizing, granulating, grinding, or sheeting.
55. A polymer composition made by the method of claim 35.
56. A method of combining a polymer and a carbon black treated with a solvent-free naphthylamine, naphthylamine derivative, diphenylamine, diphenylamine derivative, p-phenylenediamine, p-phenylenediamine derivative, other amine compound or mixtures thereof, in a first stage comprising adding to a polymer a first quantity of the treated carbon black; and, adding to said polymer a second quantity of the treated carbon black with oil or in an oil mixture, wherein a masterbatch is made during the first stage.
57. The method of claim 56 further comprising in a second stage passing the masterbatch twice through a two roll mill for cooling.
58. The method of claim 57 further comprising adding accelerators and curing agents in the second stage followed by further mixing and cooling on a two roll mill, twin screw sheeter or other cooling apparatus.
59. The method of claim 56 wherein the polymer is treated with PPD.
60. The method of claim 56 wherein the polymer includes a natural rubber (NR).
61. The method of claim 56 wherein the polymer includes a solution styrene-butadiene rubber (SSBR).
62. A method for combining a naphthylamine treated, naphthylamine derivative treated, diphenylamine treated, diphenylamine derivative treated, p-phenylenediamine

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treated, p-phenylenediamine derivative treated or other amine compound, substantially free of solvent, surface-treated carbon black with a polymer, comprising adding to a polymer a mixture comprising the surface-treated carbon black and oil and mixing.

63. The method of claim 62 wherein the treated carbon black is produced in the absence of a solvent.

64. The method of claim 62 further comprising passing the polymer through a two roll mill for cooling.

65. The method of claim 62 further comprising adding accelerators and curing agents in a further mixing step.

66. The method of claim 62 wherein the carbon black is treated with PPD.

67. The method of claim 62 wherein the polymer includes NR.

68. The method of claim 62 wherein the polymer includes an SSBR.

69. An article-of-manufacture comprising an additive carbon black produced by the method of claim 1.

70. An article-of-manufacture comprising a surface-treated additive carbon black produced by combining an amine antidegradant with carbon black in the absence of a solvent or carrier.

71. A polymeric article comprising the polymer composition produced by claim 35.

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72. The polymeric article of claim 71 wherein the polymer is rubber.
73. The polymeric article of claim 72 wherein the article comprises a tire tread.
74. The polymeric article of claim 72 wherein the article comprises a sheet.
75. A method of forming a polymeric article with well dispersed carbon black comprising making a polymer composition by the method of claim 35 and simultaneously or subsequently forming the polymer composition into an article.
76. The method of claim 75 wherein the forming is done via extrusion, molding, or calendering.

DOCKET # 03234.0001U2